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Niewald et al.

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[54] **MULTIPLE-USE UTILITY JACK AND TIRE CHANGING TOOL**

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[21] Appl. No.: **635,241**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 579,349, Feb. 13, 1984.

[51] **Int. Cl.**[4] **B66F 9/12**

[52] **U.S. Cl.** **414/607**; 414/724; 414/912; 414/910

[58] **Field of Search** 414/426, 427, 428, 433, 414/607, 724, 912, 608, 910, 911

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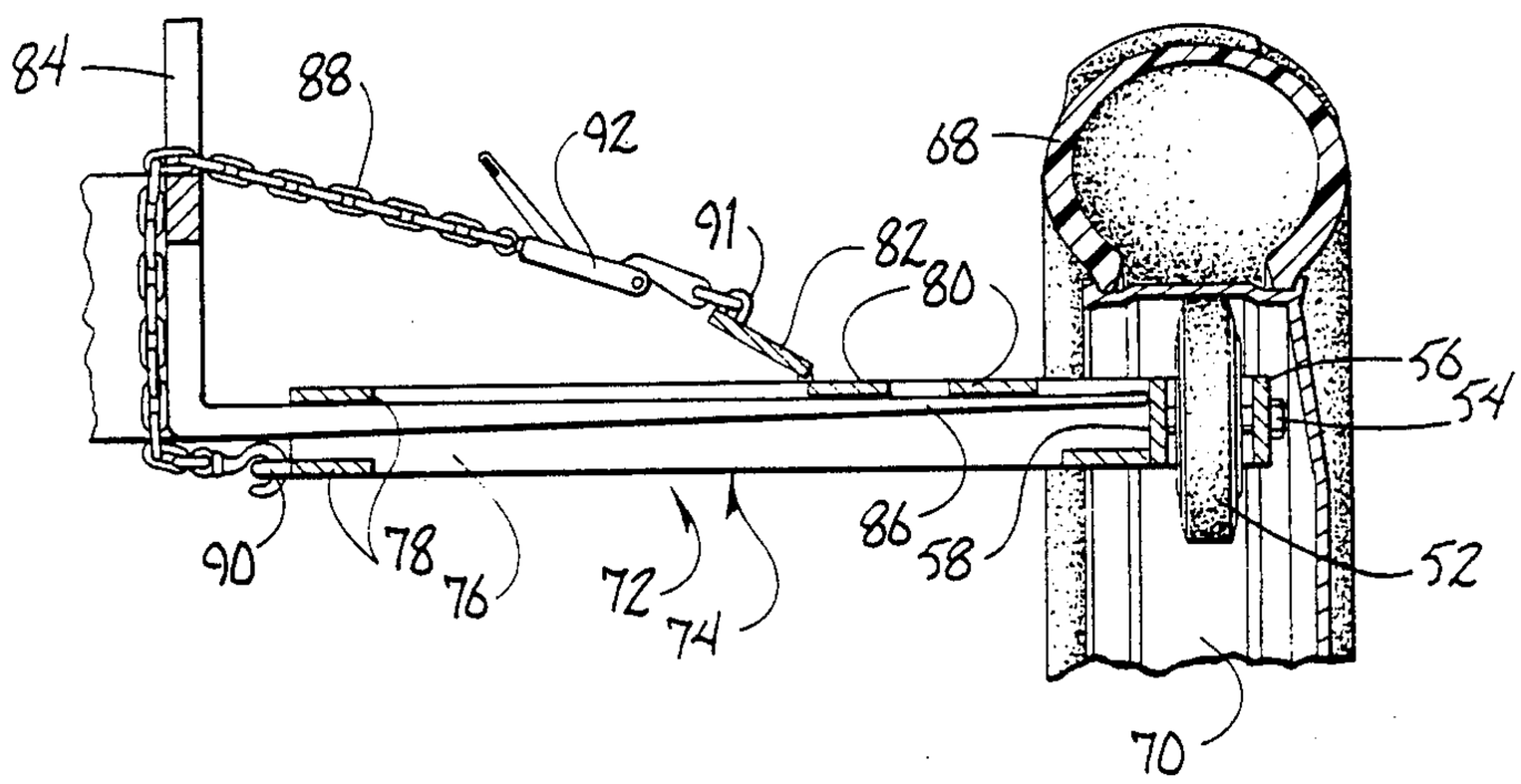
Assistant Examiner—Stuart J. Millman
Attorney, Agent, or Firm—Zarley, McKee, Thomte, Voorhees & Sease

[57] **ABSTRACT**

A multiple-use utility jack and tire changing tool which includes a base framework which is movable along the ground for application of a number of different attachment tools. An elongated mast extends upwardly from the base framework and has a masthead which is movable along the mast. The masthead has supports positioned along its vertical length for selective height-wise placement of attachments. These attachments include but are not limited to an assembly for rotatably supporting a vehicle tire, a fork, a fork with a V-bar addition, a boom, and an elbow lift. The assembly for rotatably supporting a vehicle tire includes an outwardly extending arm having at its end two tandem wheels which are aligned in the same plane and have rotational axes parallel to one another in a horizontal plane. The tandem wheels engage the top and side of the rim of the vehicle tire and cause the vehicle tire to be lifted when the masthead is lifted. When lifted, the tire may be rotated because it is supported only by the rotatable tandem wheels. The masthead is lifted by a jack. Additionally, the assembly for rotatably supporting a vehicle tire can be used separately from the base framework by attaching it to a conventional front end loader or forklift of an external motive power source.

14 Claims, 15 Drawing Figures



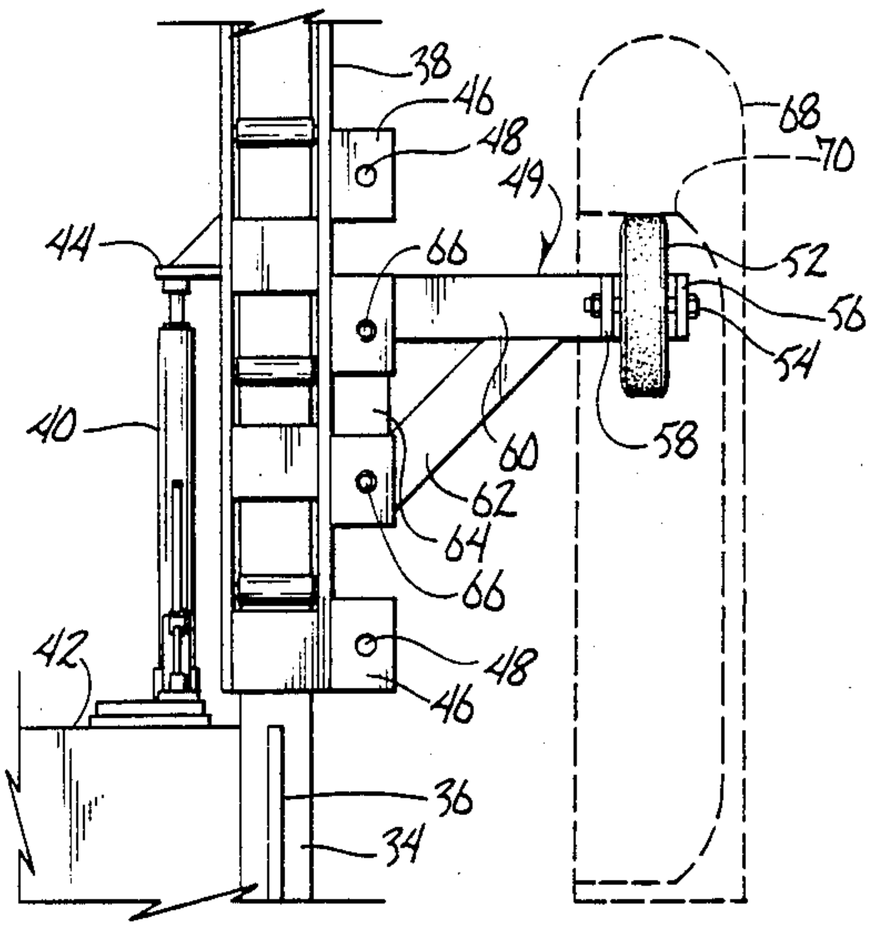


Fig. 3

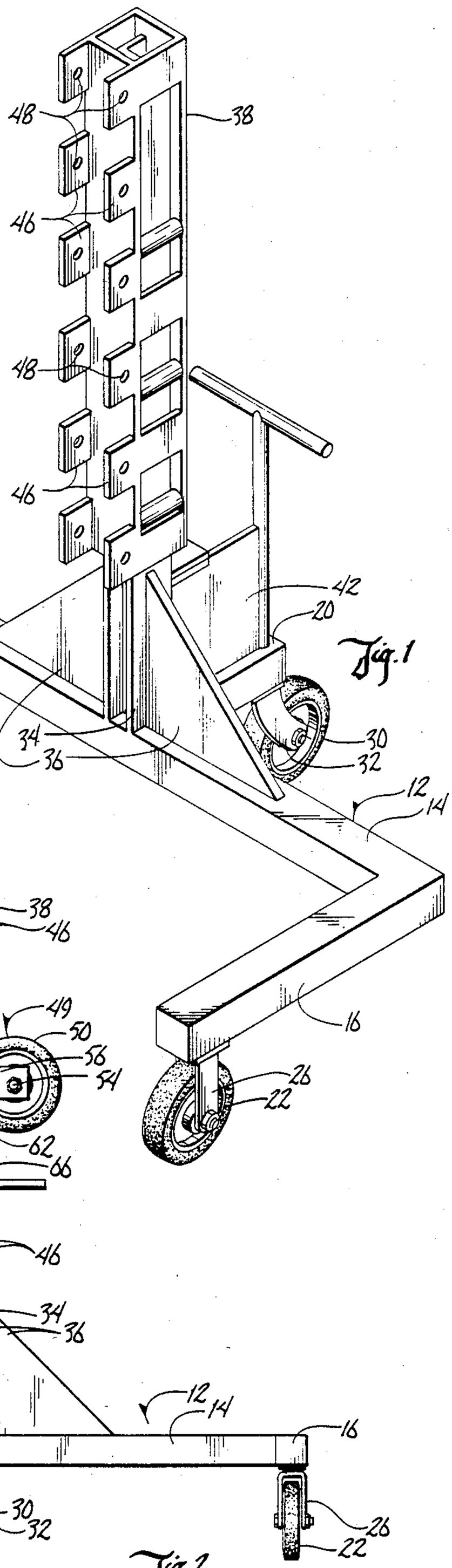


Fig. 1

Fig. 2

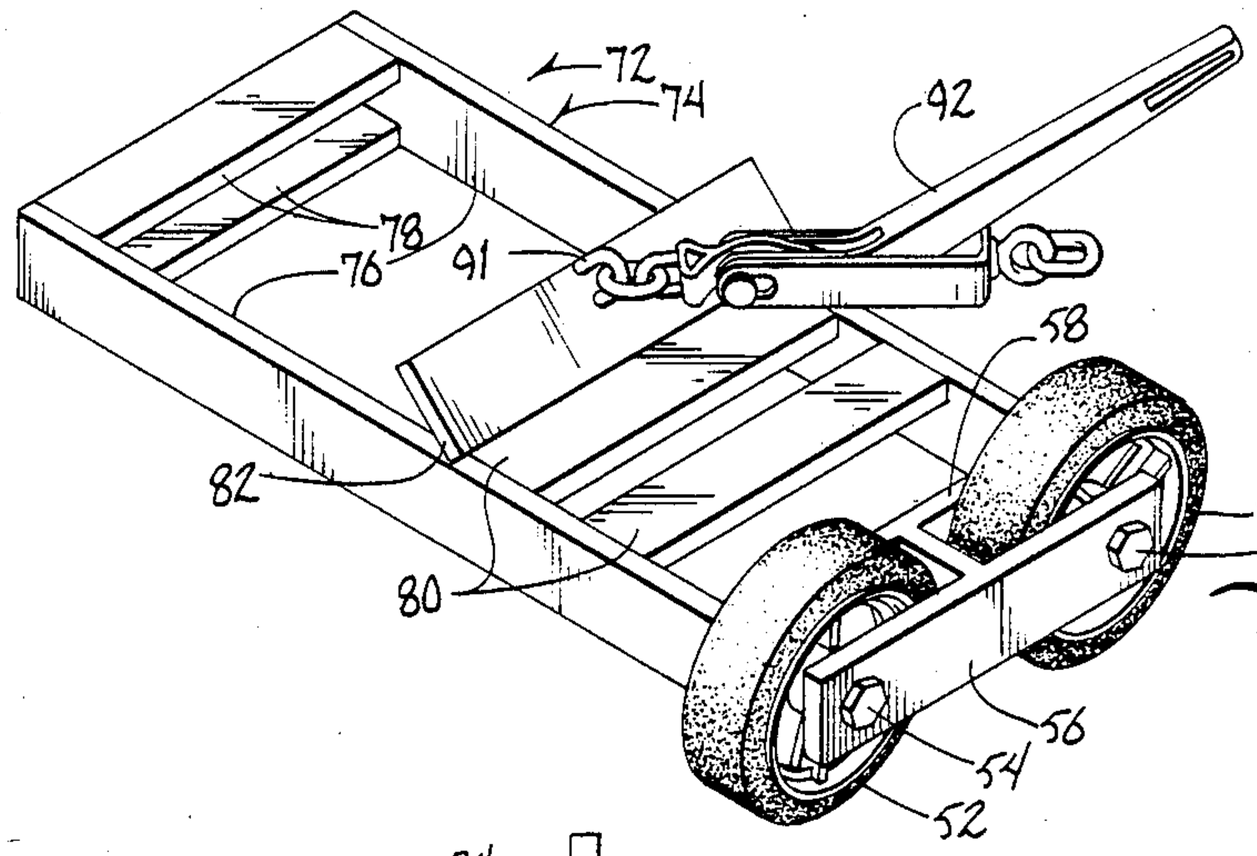


Fig. 4

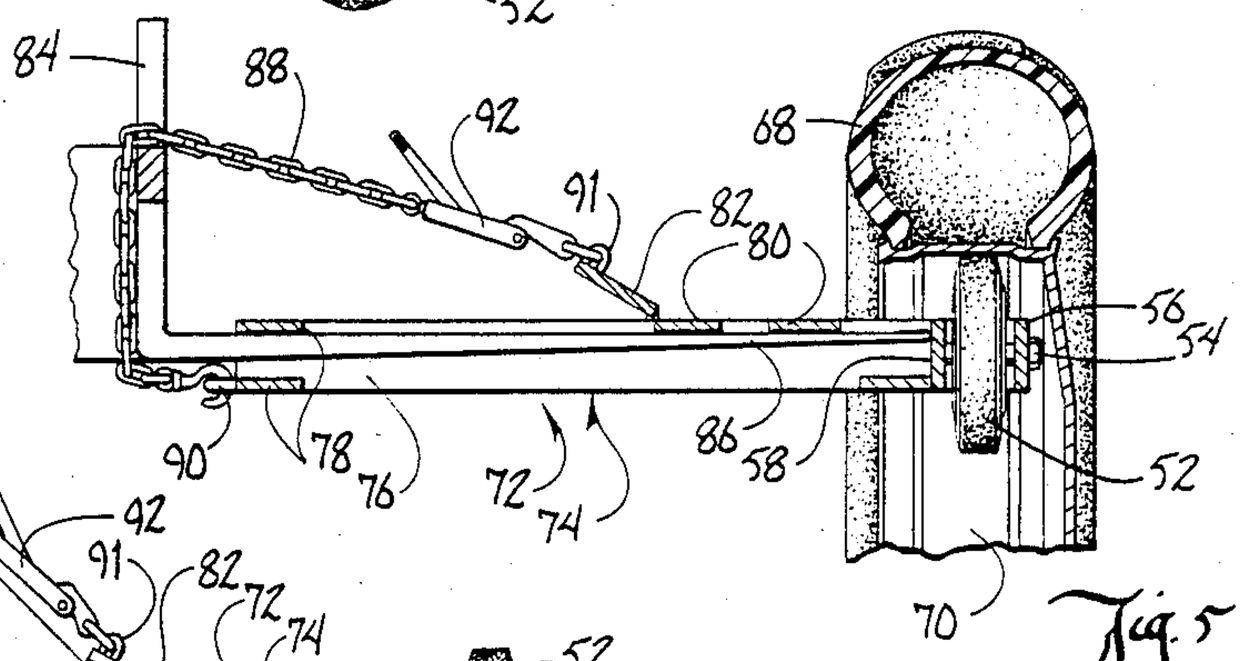


Fig. 5

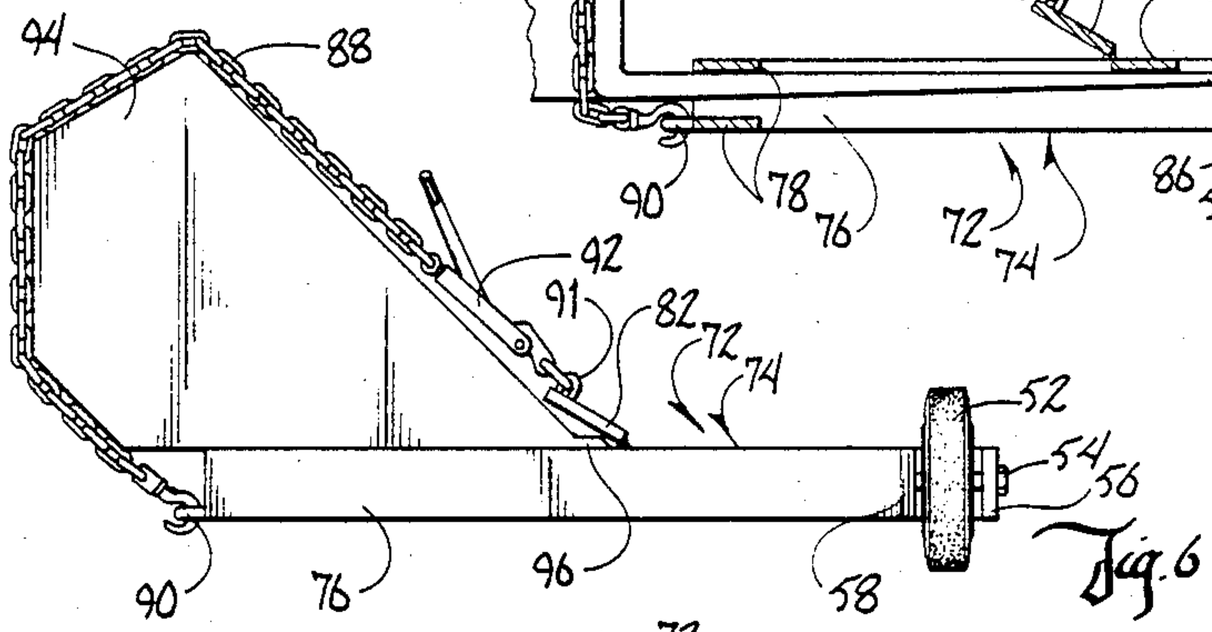


Fig. 6

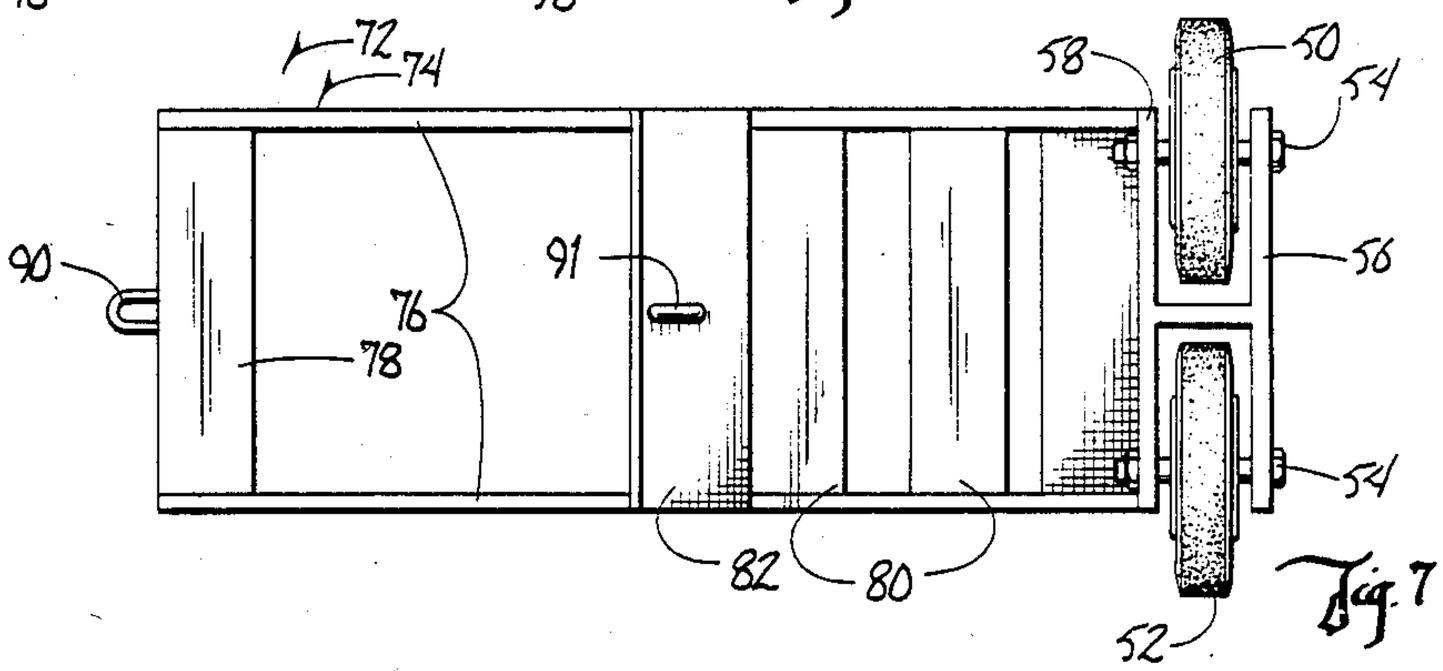


Fig. 7

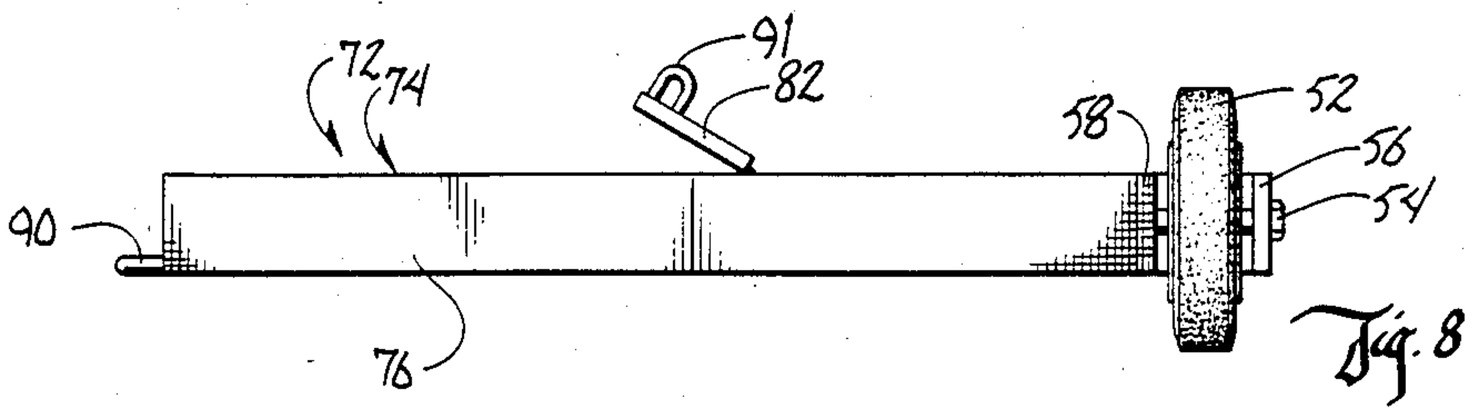


Fig. 8

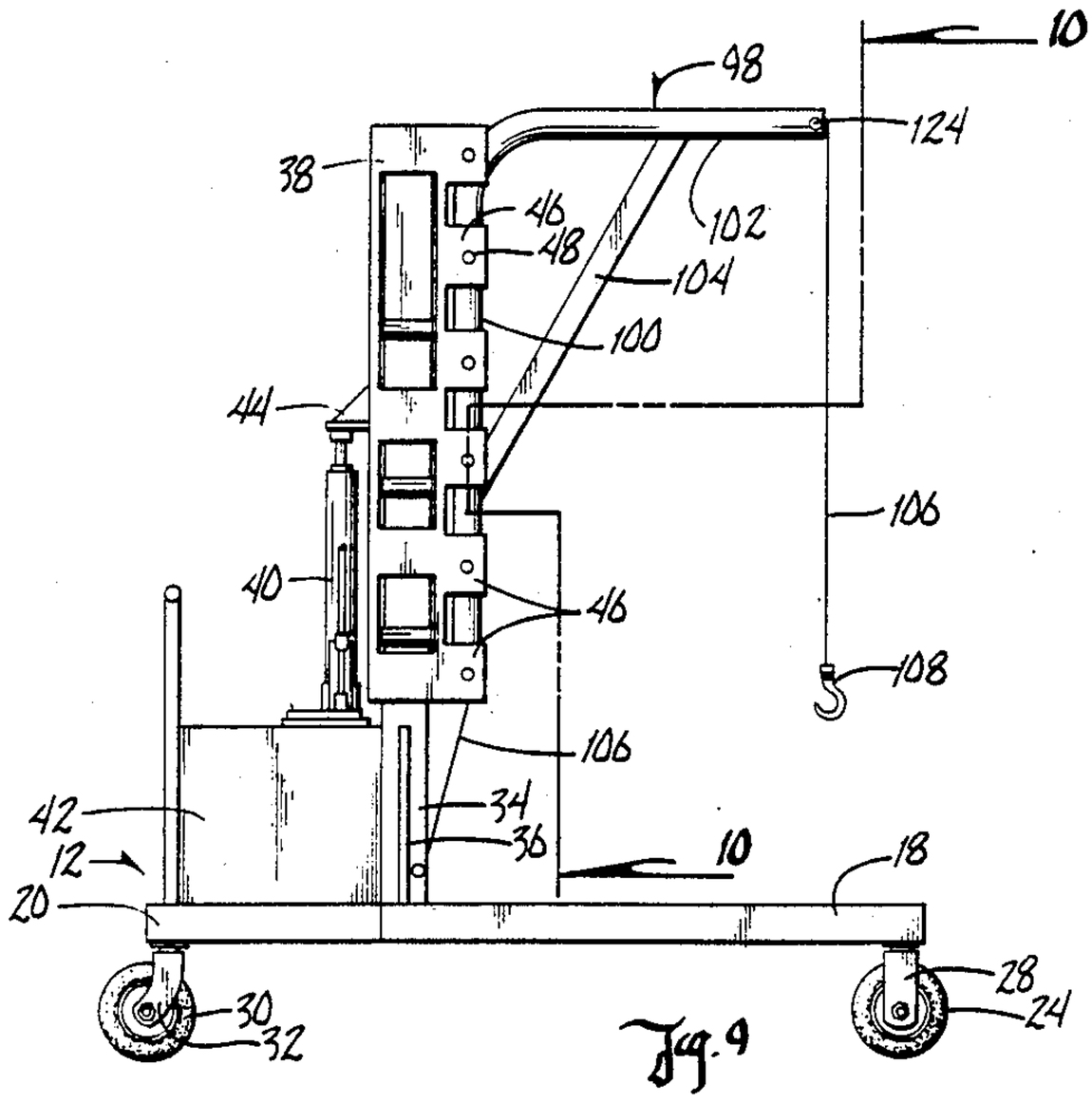


Fig. 9

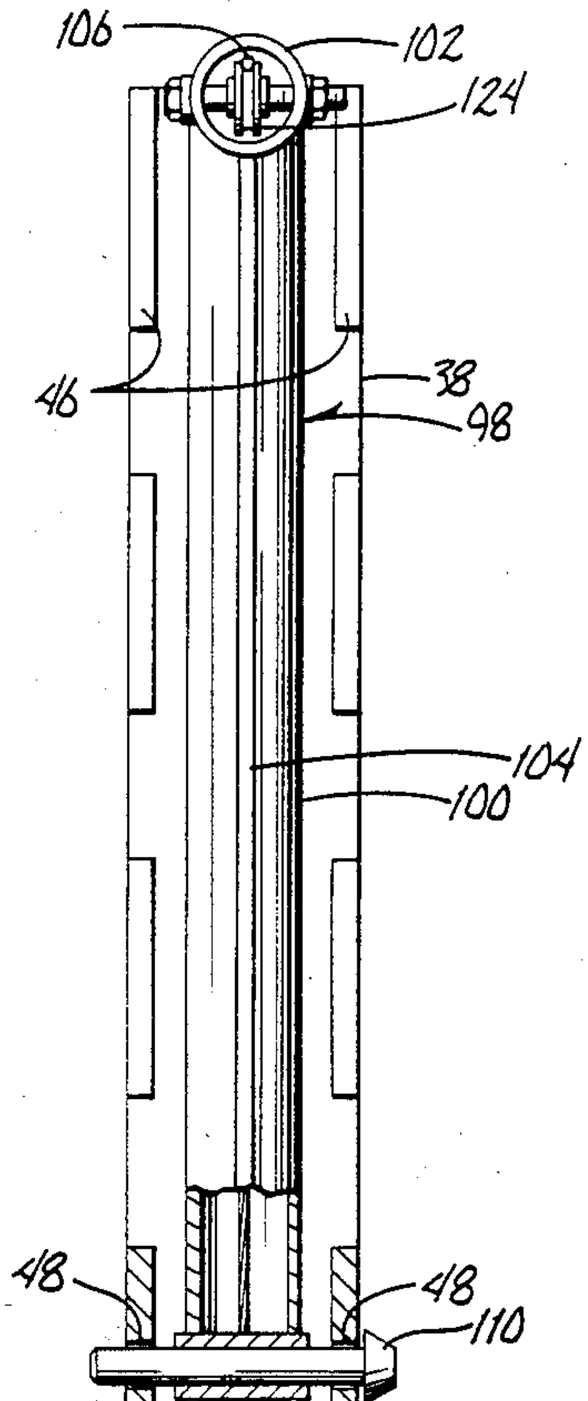


Fig. 10

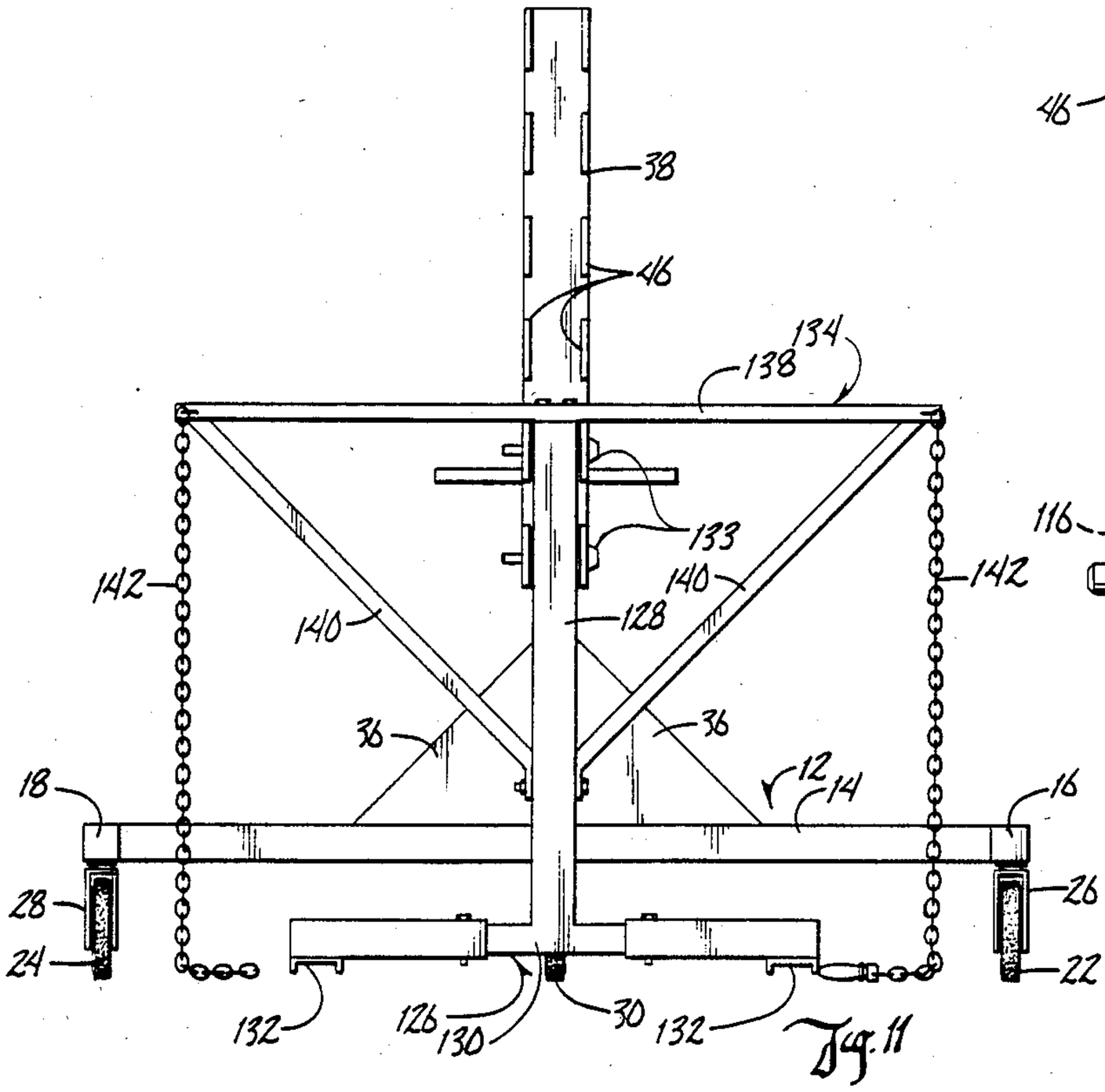


Fig. 11

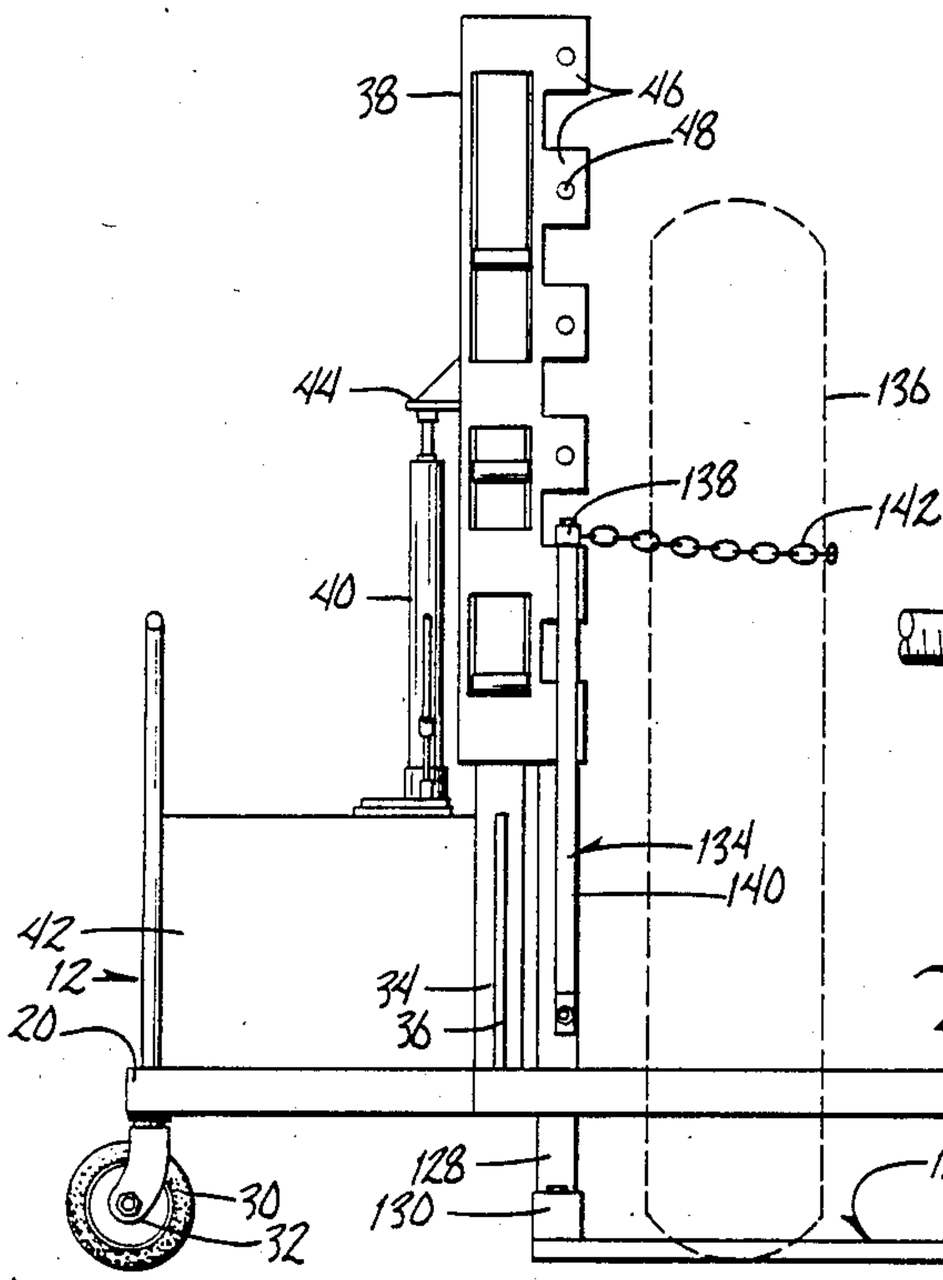


Fig. 12

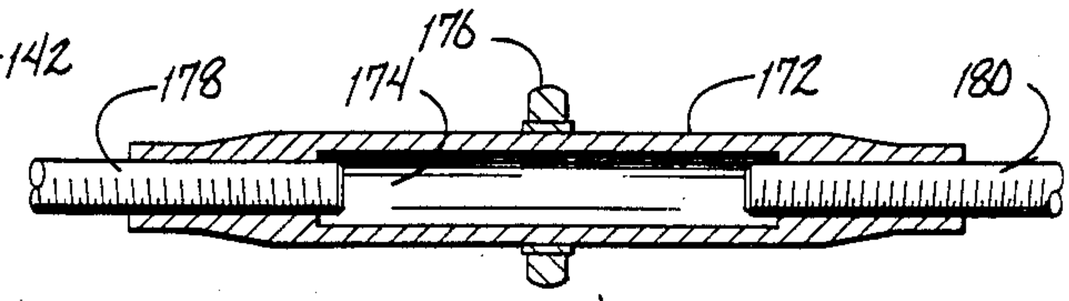


Fig. 15

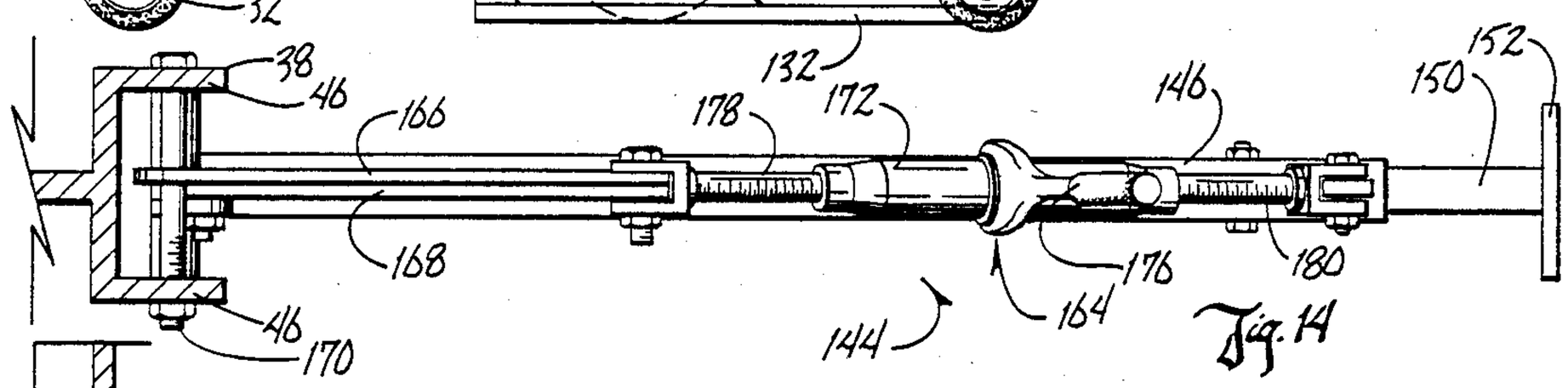


Fig. 14

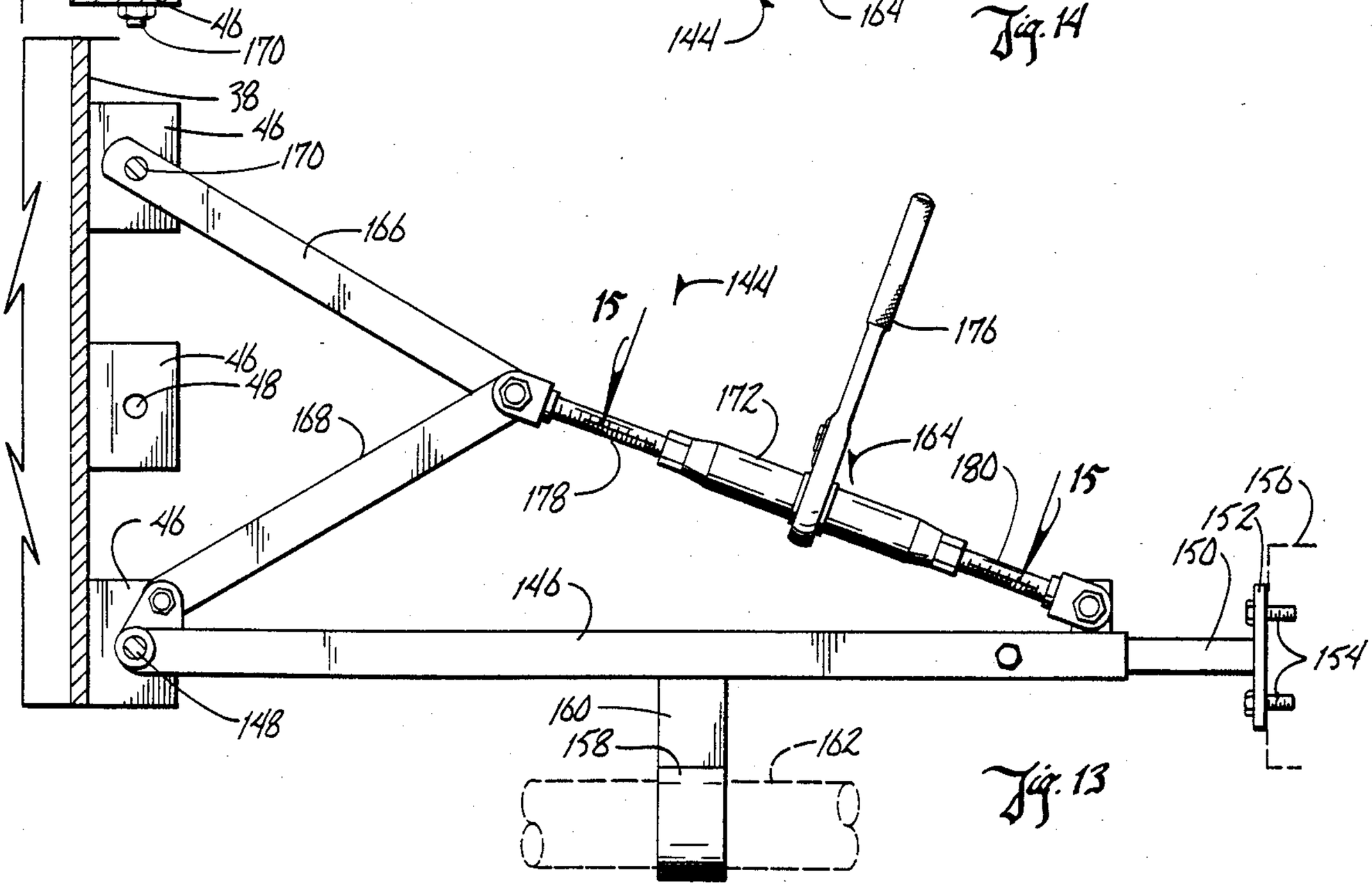


Fig. 13

MULTIPLE-USE UTILITY JACK AND TIRE CHANGING TOOL

RELATED APPLICATION

This application is a continuation-in-part to a copending application by the same inventors, namely, U.S. Ser. No. 579,349, entitled Mechanism For Lifting Tires, filed Feb. 13, 1984, now Pat. No. 4,571,142.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a multiple-use utility jack tool, more particularly, to a mechanism for performing a variety of mechanical functions utilizing interchangeable and/or isolated usable tools.

2. Problems in the Art

Maintenance and repair of large vehicles many times involves tasks wherein the mechanic requires assistance in moving, lifting, or supporting parts of the vehicle. For example, tires for farm tractors present particular handling problems because of their size and weight. The large drive wheels for farm tractors from time to time must be removed, transported, or rotated, and must be lifted for these purposes. In particular, a problem arises in the handling of dual tractor wheels, in that the outside dual wheels of the tractor are added and removed depending on the selected use of the tractor.

Furthermore, final drives for tractors from time to time need to be removed and/or replaced requiring support and adjustment for positioning while performing these tasks. Axles and drive shafts also need to be supported when performing maintenance or repair and this cannot be accomplished by the mechanic alone.

Other tasks around the shop or machine shed necessitate tools for lifting and raising various parts, other tools, or miscellaneous objects which then many times must be transported to another location.

At other times, there is a need to have the wheel supporting mechanism portable and independent of the jack mechanism so that it can be attached to a conventional front end loader or forklift and be used with an auxiliary lifting and power source either locally or remotely.

It is therefore an object of this invention to provide a multiple-use utility jack and tire changing tool which solves or improves upon the deficiencies in the art.

A further object of this invention is to provide a multiple-use utility jack and tire changing tool which allows a variety of beneficial tools to be quickly interchanged or used.

Another object of this invention is to provide a multiple-use utility jack and tire changing tool which combines vertically adjustable support with portability.

A further object of this invention is to provide a multiple-use utility jack and tire changing tool which can be itself adjusted for various uses, and for each use, for various heights.

Another object of this invention is to provide a multiple-use utility jack and tire changing tool which is durable, economical, and cost efficient.

A further object of this invention is to provide a tire changing tool which can be used with a front end loader or fork lift.

Additional objects, features and advantages of the invention will become apparent with reference to the accompanying drawings and description.

SUMMARY OF THE INVENTION

This invention utilizes in one embodiment, a base framework having ground contacting means to allow easy movement along the ground. A super structure extends upwardly from the base framework which includes a mast which has a vertically adjustable masthead attached thereto.

The masthead itself has along its length means for securing any of a variety of attachment tools thereto.

A jack means is secured to the base framework and abuts the masthead so that upon operation of the jack, the masthead and the attendant attachment tool can be selectively raised or lowered.

The base framework has the ability to be selectively positioned and moved along the ground. The various attachments to the masthead thus can be used to perform their function and then the whole unit with, or without the part being worked on, can be transported to a different location.

The jack means allows for the vertical adjustability of the masthead. The vertical height adjustability of the masthead is thus limited by the extension limits of the jack. A plurality of attachment means along the vertical length of the masthead provides additional optional height adjustment. Each attachment tool can be selectively positioned on the masthead from any position either near the top all the way to the bottom. Therefore, for different uses, different initial heights can be selected.

The selection of attachment tools includes a rotatable supporting means for vehicle tires, a boom, a forklift, a forklift with a V-bar addition, and an elbow lift. Other attachment tools are, of course, possible.

The rotatable vehicle tire support consists of an extension means from the masthead to a tire contacting means which has two side-by-side rotatable wheels which are disposed in the same vertical plane and have rotational axes disposed in the same horizontal plane. The two rotatable wheels are positionable on the top of the inside rim of the vehicle tire and allow the vehicle tire to be raised and supported while at the same time being rotated. This tool usually facilitates the changing of vehicle tires, especially the outer dual wheels of farm tractors.

The boom attachment tool simply comprises a conventional boom having a line and hook extending from its outermost end. The boom can then be lifted by operation of the jack and masthead concurrently lifting anything attached to the line and hook.

A standard forklift can also be attached to the masthead to be vertically adjustable with respect to the ground. By adding a V-bar addition, comprising a crossbar and V-shaped supports, a vehicle tire such as a tractor tire can be supported on the forklift and retained by resting the tire against the crossbar and securing a chain from both ends of the crossbar around the middle section of the tire.

The elbow lift basically consists of a pivotable outwardly extending arm on which are grasping means. The grasping means consists either of some sort of plate member at the outer end of the arm to be bolted on or otherwise grasp a mechanism such as a final drive mechanism of a farm tractor. An additional embodiment includes a circular ring attached below the arm for surrounding and supporting such things as a vehicle axle or drive member. The elbow lift can be vertically adjusted by a ratchet means which is connected at one

end to the outer end of the arm and at its other end to a bar which is hingably attached above the arm on the masthead.

It is sometimes advantageous to utilize the rotatable tire support attachment tool separate from the base framework and jack. This can be accomplished by utilizing the same vehicle tire contacting means with the two side-by-side rotatable wheels in an embodiment in which they can be secured to a conventional front end loader or forklift attachment for an auxiliary motive and lifting means. This can be accomplished by having a simple framework into which can be inserted the tines of a conventional forklift or to which can be secured the bucket of a conventional front end loader and then secured by a means such as a chain with a load binder.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of the base framework of the invention.

FIG. **2** is a front elevational view of the invention of FIG. **1** with a rotatable tire support attachment tool secured thereto.

FIG. **3** is a partial side view taken along line **3—3** of FIG. **2**.

FIG. **4** is a perspective view of the individually utilizable rotatable wheel support attachment tool.

FIG. **5** is a partial sectional view of the tool of FIG. **4** showing its use with a conventional forklift lifting a vehicle tire.

FIG. **6** is a side view of the invention of FIG. **4** showing its use with a conventional end loader.

FIG. **7** is a top view of the device of FIG. **4**.

FIG. **8** is a side view of the device of FIG. **4**.

FIG. **9** is a side view of the device of FIG. **2** with a boom attachment tool.

FIG. **10** is taken along line **10—10** of FIG. **9**.

FIG. **11** is a front elevational view of the invention of FIG. **1** with a forklift tool attachment and a V-bar tool attachment.

FIG. **12** is a side view of the embodiment of FIG. **11** showing its use for holding and supporting a vehicle tire.

FIG. **13** is a partial view of the embodiment of FIG. **1** with an elbow lift attachment tool.

FIG. **14** is a partial sectional and top view of the embodiment shown in FIG. **13**.

FIG. **15** is a sectional view taken line **15—15** of FIG. **13**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

In reference to the drawings, and particularly FIG. **1**, there is shown a base framework **12** in accordance with the invention. Base framework **12** is comprised of an elongated center piece **14** having end arms **16** and **18** extending perpendicularly from opposite ends of center piece **14**, and a middle arm **20** extending perpendicularly in an opposite direction to end arms **16** and **18** from the middle of center piece **14**. Wheels **22** and **24** are rotatably attached to yokes **26** and **28** which are in turn secured to end arms **16** and **18** respectively. Wheel **30** is rotatably attached to swivelable yoke **32** which is attached to middle arm **20**. All wheels **22**, **24** and **30** extend downwardly from framework **12** and contact the ground to allow the invention **10** to be easily moved along the ground. The swivelability or pivotability of yoke **32** allows the invention **10** to be steered as it is moved and maneuvered to a desired position.

The downwardly extending legs of yoke **32** are angled or curved from the vertical to cause wheel **30** to turn in the direction the invention **10** is pushed or pulled (see FIGS. **1**, **9** and **12**).

A mast **34** extends upwardly from the middle of center piece **14** and can have support pieces such as gusset **36** secured between it and center piece **14** for greater stability and strength. A masthead **38** is vertically movable along mast **34** by means of a jack **40** (see FIG. **3**) which is secured at its lower end to platform member **42** on middle arm **20**, and abuts at its top end projection **44** (see FIG. **3**) from masthead **38**.

A plurality of pairs of matching flanges **46** are secured along the length of masthead **38**. Each flange **46** extends in the direction of end arms **16** and **18** from along an edge of masthead **38**. Flanges **46** are evenly spaced along the length of the masthead **38** and have aligned apertures **48** to allow for the securement of accessory attachments at a selected position along masthead **38** by pins inserted therebetween.

Based framework **12** basically provides the mobile support for a variety of interchangeable tools which will be discussed below. The raising and lowering of masthead **38** is accomplished by operation of hydraulic jack **40**. The extended vertical adjustability of masthead **38** depends directly upon the limits of extension of jack **40**. Therefore, flanges **46** allow the user to selectively position the accessories at an initial height which is most advantageous and then be able to raise the whole masthead assembly **38** by jack **40**. This allows for more flexibility for various uses.

It is also to be understood that steering of the base framework **12** is accomplished by pivoting of wheel **30**. Wheel **30** could optionally attached to a steering bar so that it could be directly steered. Also, a manually operated brake could be installed for any of wheels **22**, **24** or **30** to assist in control of the device when in motion or for keeping the device stationary on sloped surfaces.

A first accessory for use with base framework **12** is shown in FIGS. **2** and **3**. A rotatable wheel support **49** is selectively secured to flanges **46** of masthead **38**.

Two small tandem wheels **50** and **52** are rotatably secured to the outer end of rotatable wheel support **49**. Tandem wheels **50** and **52** are positioned so that they are vertically upright in the same vertical plane, and have rotational axes in the same horizontal plane.

Rotatable wheels **50** and **52** are held in place by axles **54** and front and back plates **56** and **58**, respectively.

Attachment to masthead **38** is accomplished by extension arm **60** and support arm **62**. Both fit between a pair of flanges **46** and are secured there by a pin **66**. An intermediate member **64** is positioned between the ends of support and extension arms **62** and **60** along the masthead **38** for additional support.

The dashed lines in FIGS. **2** and **3** depict a vehicle tire **68** having a rim **70**. Tandem wheels **50** and **52** are moved into the cavity defined by rim **70** and then jack **40** is operated to bring wheels **50** and **52** into contact with the upper part of the rim. By continuing to raise jack **40**, the vehicle tire is also raised.

Once the vehicle tire is completely removed from the vehicle, it is supported purely by tandem wheels **50** and **52** and can therefore be freely rotated. The tire **68** is balanced on wheels **50** and **52** and therefore the entire base framework **12** can be moved with the vehicle tire **68** intact.

By referring to FIGS. **4–8**, another embodiment of the invention can be seen. A rotatable wheel support **72**

is shown which operated essentially the same as that shown in FIGS. **2** and **3** but for the fact that its vertical adjustability is controlled by an external lifting and motive means.

To facilitate this, a framework **74** is constructed consisting of parallel side members **76**, end cross members **78**, cross supports **80** and reception member **82**.

FIG. **5** depicts the use of rotatable wheel support **72** with a conventional forklift **84** wherein tines **86** are inserted between end cross members **78** and side members **76**. A chain **88** is attached between eye member **90** (which is secured to lower cross member **78**) and is positioned over and around the forklift to where it is attached to eye members **91** on reception member **82**. The chain is securely tightened by operation of load binder **92** disposed therebetween.

FIG. **6** depicts the use of rotatable wheel support **72** with a conventional front end loader bucket **94**. The front lip **96** of bucket **94** is wedged underneath reception member **82** and then chain **88** is secured around bucket **94** from eye member **90** to eye member **91** and tightened and secured by load binder **92**.

Operation of rotatable wheel support **72** then is accomplished by positioning tandem wheels **50** and **52** by operation of an external lifting and motive means such as the hydraulically controlled lift means of a tractor or forklift tractor (not shown).

FIG. **9** depicts another accessory tool for operative attachment to base framework **12**. A boom **98** having a vertical leg **100** which is secured to two or more of flanges **46** of masthead **38** is rigidly connected to a horizontal boom arm **102** which extends outwardly from masthead **38**. A support member **104** extends between horizontal boom arm **102** and vertical member **100** for support. A cable **106** extends from the outer end of horizontal boom arm **102** and terminates in a hook member **108** which can be used to connect to selected objects to be raised and/or moved.

By referring to FIG. **10**, the exact manner in which vertical member **100** is connected to masthead **38** is shown and the manner in which cable **106** is secured to boom **98** is shown. A pin **110** is inserted through a sleeve **102** which itself extends though vertical member **100**. Pin **110** thus matches apertures **48** in a pair of flanges **46**. At the lower end of vertical member **100**, two flanges **114** with apertures **116** are mounted and a pin **118** extends through a pair of matching flanges **46** and through apertures **116**. Cable **106** is secured at its lower end of mast **34** by means of hook **120** to a bolt **122** securely set within mast **34**. Cable **106** thus runs through vertical member **100** and horizontal boom arm **102** and exits and extends over a pulley means **124** inserted at the end of horizontal boom arm **102**.

Boom **98** thus can be used to hook onto an item and raise that item the distance to which jack **40** can be raised. By varying the length of cable **106** or by selected positioning of vertical member **100** against masthead **38**, the position of hook member **108** can be varied.

FIGS. **11** and **12** depict another accessory tool for use with base framework **12**. A fork **126** having a vertical member **128**, a cross beam **130** and tines **132** is selectively securable to the flanges **46** of masthead **38** by pins **133** similar to that of vertical member **100** of the boom **98** in FIGS. **9** and **10**. Vertical member **128** differs in that it extends downwardly along masthead **38** and mast **34** so that tines **132** can contact the ground. Fork **126** can be used to lift and move pallets or other wide items, and by additional use of optional V-bar **134**, shown in FIGS. **11** and **12**, an object such as a large vehicle tire **136** can be lifted, supported and secured.

V-bar **134** consists of a top cross bar **138** attached to vertical member **128** of fork **126**, and then has V-shaped support bars **140** extending from the outermost ends of top crossbar **138** inwardly and downwardly to vertical member **128**. Chains **142** are attached to the outermost ends of top crossbar **138**, and as can be seen in FIG. **12**, large vehicle tire **136** is cradled by tines **132** and held in place by securing chains **140** around tire **136**.

A further additional accessory tool to be used with base framework **12** is depicted in FIGS. **13–15**. An elbow lift **144** consists of a horizontal bar **146** which is pivotally attached to a pair of flanges **46** by a pin **148**. Horizontal member **146** has a front extension piece **150** to which can be mounted machinery parts depicted by dashed lines **156** in FIG. **13**. Additionally, horizontal arm **146** could have a ring member **158** mounted by mounting bar **160** to the underside of horizontal arm **146**. Ring member **158** is used to support and retain articles such as axles or drive mechanisms depicted in dashed lines by **162**.

Elbow lift **144** operates by means of ratchet mechanism **164**. As shown in FIG. **13**, ratchet mechanism **164** is hingably secured at its outer end to horizontal member **146**. Its inner end is secured to two hingable bars **166** and **168**. Hingable bar **166** is in turn hingably connected to flanges **46** by a pin **170** above the connection of horizontal arm **146** to masthead **38**. Hingeable bar **168** is hingedly attached at its innermost end to horizontal bar **146**.

By referring specifically to FIG. **15**, it can be seen that ratchet mechanism **146** is comprised of a housing **172** having a channel **174** therethrough. The inner surfaces of the ends of housing **172** are threaded. Ratchet tool **176** is rigidly attached to housing **172**. Threaded bars **178** and **180** are at their inner ends threadably insertable into threaded ends of housing **172** and are hingably attached to horizontal member **146** and hinged bars **166** and **168**, respectively. It is to be understood that threaded bar **178** and **180** have opposite threads so that when ratchet tool **176** is turned, the bars **178** and **180** move in opposite directions, either inwardly or outwardly, thereby either raising or lowering horizontal bar **146**.

Elbow lift **44** can have various grasping adapter plates or other devices attached to it for different applications. The operation of ratchet mechanism **164** allows for minute vertical positioning.

The included preferred embodiment is given by way of example only, and not by way of limitation to the invention, which is solely described by the claims herein. Variations obvious to one skilled in the art will be included within the invention defined by the claims.

What is claimed is:

1. A load handling attachment for lifting, supporting, lowering and transporting a vehicle tire having a rim, said attachment being readily removeably securable to and operable from an external motive and lifting means, comprising:

a framework having a top and bottom, and front, back, left and right sides;

a vehicle tire rim contacting and supporting means attached to said front of said framework comprising tandem rotatable wheels aligned in the same vertical plane and having rotational axes parallel to one another in the same horizontal plane, said wheels being horizontally spaced-apart but being

located close together so as to be able to be placed within the recess of the tire rim so as to rollingly support the tire rim thereon, said tandem wheels being contactable with the interior of said rim of said vehicle tire to support said tire while allowing rotation of said tire;

a means for readily removably mounting said framework upon said external motive and lifting means; and

a means for removably securing said framework to said external motive and lifting means.

2. The attachment of claim **1** wherein back side is comprised of two spaced apart horizontal members being secured at opposite ends to said left and right sides and leaving a uniform gap therebetween.

3. The attachment of claim **1** wherein said framework further comprises support members secured between sides of said framework.

4. The attachment of claim **1** wherein said external motive and lifting means comprises a conventional loader bucket attached to a hydraulic front end loader mechanism attached to a conventional motive means.

5. The attachment of claim **4** wherein said means for removably mounting upon said external motive and lifting means comprises a plate having a front and a back edge, said front edge being attached to and extending across said framework from said left to said right side, and being angularly oriented so that said back edge is raised from said front edge, so that said leading edge of said loader bucket can be matingly inserted and mounted therein.

6. The attachment of claim **4** wherein said means for securing said framework comprises a chain attached at one end to said means for removably mounting, and attached at said other end to said rear end of said framework, and having a means for releasably securing and tightening said chain disposed therebetween.

7. The attachment of claim **6** wherein said means for securing and tightening said chain comprises a conventional load binder mechanism.

8. The attachment of claim **1** wherein said external motive and lifting means comprises a forklift attached to a conventional lifting means.

9. The attachment of claim **8** wherein said means for removably mounting said external motive and lifting means comprises said horizontal spaced apart plates at said back side of said framework, so that said forklift can be inserted between said horizontal members.

10. The attachment of claim **8** wherein said means to secure said framework comprises a chain having a first end attached to said framework toward the front of said framework, and a second end attached to the rear of said framework below said horizontal members, and having a means to secure and tighten said chain disposed therebetween.

11. The attachment of claim **10** wherein said means to secure and tighten said chain comprises a conventional load binder.

12. The attachment of claim **4** wherein said conventional motive means comprises a conventional tractor.

13. The attachment of claim **8** wherein said conventional lifting means comprises a hydraulic front end lifter of a conventional tractor.

14. The attachment of claim **8** wherein said conventional lifting means comprises a conventional forklift truck.

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